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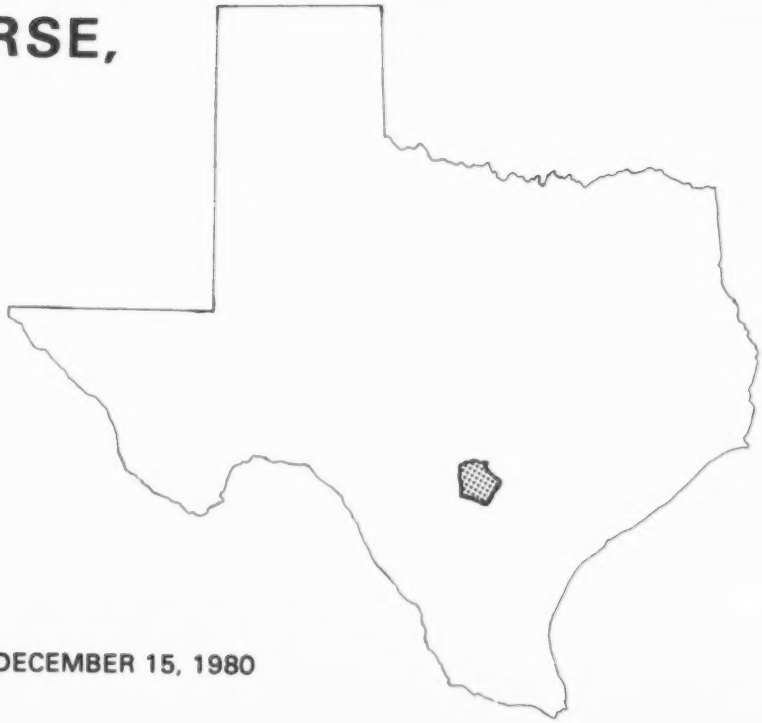
FLOOD INSURANCE STUDY

CITY OF CONVERSE, TEXAS
BEXAR COUNTY



DECEMBER 15, 1980

federal emergency management agency
federal insurance administration

COMMUNITY NUMBER - 480038

FEM 1.209:

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West Salitrillo Creek Panels 01P-03P

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PUBLISHED SEPARATELY:

Flood Insurance Rate Map

FLOOD INSURANCE STUDY
CITY OF CONVERSE, TEXAS

1.0 INTRODUCTION

1.1 Purpose of Study

The purpose of this Flood Insurance Study is to investigate the existence and severity of flood hazards in the City of Converse, Bexar County, Texas, and to aid in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. Initial use of the information will be to convert the City of Converse to the regular program of flood insurance by the Federal Insurance Administration (FIA). Further use of the information will be made by local and regional planners in their efforts to promote sound land use and flood plain development.

1.2 Coordination

Regional drainage area-frequency discharge relationships used in this study were coordinated by the U.S. Geological Survey (USGS) with those used in studies of nearby areas by the U.S. Army Corps of Engineers (COE) (References 1-7), U.S. Soil Conservation Service (SCS) (Reference 8), and USGS (References 9-11). An announcement of this study was made by a legal notice in the local newspaper "The Valley News," which is published for distribution in Seguin and other nearby communities, including Converse.

The initial time and cost meeting, which included officials of the City of Converse and USGS personnel, was held on December 11, 1975. At this and subsequent informal meetings, such items as local flooding problems, available community maps, and available elevation reference marks around the study area were discussed. The map selected as the base for the study is a part of the Geological Survey Schertz, Texas, quadrangle topographic map (1967) with the horizontal scale reduced from 1:24,000 to 1:6,000 with 10-foot contour intervals (Reference 9). The elevation reference marks used in the ground surveys of the cross sections were established by the U.S. Coast and Geodetic Survey, the Texas Department of Highways and Public Transportation, the COE, and the USGS.

On March 5, 1980, the results of the study were reviewed at the final meeting attended by representatives of USGS, FIA, and community officials. This study was acceptable to the community.

1.3 Authority and Acknowledgments

The source of authority for this Flood Insurance Study is the National Flood Insurance Act of 1968, as amended.

The hydrologic and hydraulic analyses for this study were performed by the United States Geological Survey, Water Resources Division, Austin, Texas for the Federal Insurance Administration under Inter-Agency Agreement No. IAAH-9-77, Project Order No. 13. This work, which was completed in October 1979, covered all significant flooding sources in the City of Converse.

2.0 AREA STUDIED

2.1 Scope of Study

This Flood Insurance Study covers the incorporated area of the City of Converse. The area of study is shown on the Vicinity Map (Figure 1).

Flooding on Salitrillo Creek, a tributary to Martinez Creek, was studied in detail on the west branch, which forms part of the western corporate limits and the east branch, which forms part of the eastern corporate limits.

The areas studied by detailed methods were selected with priority given to all known flood hazard areas, and areas of projected development or proposed construction for the next five years, through October 1984.

2.2 Community Description

The City of Converse, which is in the northeast part of Bexar County, has a population of 4,500 (Reference 12), an increase of 3,120 over the 1970 census. The economy of the area is diversified, including industry, agriculture, and military bases.

The natural drainage system consists of East and West Salitrillo Creeks, which drain the area north and northwest of the city encompassing all of Live Oak and parts of Universal City.

2.3 Principal Flood Problems

Flooding in the City of Converse is the result of intense thunderstorm activity over a relatively small area, during which streams frequently overflow because of the inadequate carrying capacity of the natural channels. Two streams, East Salitrillo Creek and West Salitrillo Creek, form part of the boundaries for the city. Flooding occurs along both branches. Some backwater is caused by the road crossing on West Salitrillo Creek at Schaefer Road and at State Highway 78. Most of the flooding is confined to the undeveloped areas along both streams.

APPROXIMATE SCALE

0 1000 2000 3000 4000 5000 6000 7000 FEET

VICINITY MAP

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

CITY OF CONVERSE, TX
(BEXAR CO.)

FIGURE 1

2.4 Flood Protection Measures

Flood protection measures have been effective for the two streams by the SCS. These consist of two reservoirs and some land treatment measures. The following is an excerpt from the referenced report (Reference 8): "Flooding occurs very frequently in the Martinez Creek watershed, of which the two streams in this study are a part, and causes severe damage. During the 30-year period studied, 1923 to 1952, inclusive which is representatives of normal rainfall in this area, there were 26 floods that inundated more than half of the flood plain as well as 53 smaller floods."

The combined program of land treatment and structural measures described in the report would confine damage from 31 of the total number of 79 floods to areas of less than one-tenth of the flood plain. Of the 26 major floods that inundated more than one-half of the flood plain, 21 would be reduced to minor floods, inundating less than one-half the flood plain.

It is evident from the above statement that flooding will occur for some of the extreme events even with the protective measures in effect.

3.0 ENGINEERING METHODS

For flooding sources studied in detail in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Floods having recurrence intervals of 10-, 50-, 100-, and 500-years have been selected as having special significance for flood plain management and for flood insurance premium rates. The analyses reported here reflect current conditions in the drainage areas of the streams.

3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish peak discharge-frequency relationships for floods of the selected recurrence intervals for each flooding source studied in detail in the community.

Flood frequency curves for the 10-, 50-, 100-, and 500-year floods were prepared by using the results of multiple-regression analysis for Region 5 of flood characteristics in the San Antonio area (Reference 13), discharge data for area streams, and data from the COE (References 1-7) and the SCS (Reference 8).

The peak discharge-drainage area relationships for the selected recurrence intervals are presented in Table 1, "Summary of Discharges."

TABLE 1 - SUMMARY OF DISCHARGES

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10-YEAR	50-YEAR	100-YEAR	500-YEAR
WEST SALITRILLO CREEK					
Just downstream of Farm Market Road 1516*	5.51	2,000	2,970	3,600	6,600
Just downstream of Schaefer Road	5.28	1,850	2,770	3,300	6,200
Approximately 2200 feet upstream of State Highway 78	4.83	1,500	2,270	2,700	5,400
At Avenue E (Extended)	4.47	1,350	1,870	2,250	4,800
Approximately 150 feet downstream of Southern Pacific Railroad	4.08	1,000	1,470	1,800	4,200
Approximately 1920 feet upstream of Farm Market Road 1976	2.87	120	200	230	2,150
EAST SALITRILLO CREEK					
Approximately 950 feet downstream of Schaefer Road	8.20	3,750	5,670	6,900	10,900
Just downstream of Schaefer Road	8.06	3,650	5,470	6,700	10,600
Approximately 2000 feet upstream of Schaefer Road	7.56	3,350	4,970	6,000	9,700
Approximately 120 feet downstream of Farm Market Road 78	5.00	1,600	2,320	2,900	5,600
Approximately 100 feet downstream of Farm Market Road 1976	4.88	1,500	2,220	2,700	5,400
At cross section I	4.50	1,250	1,820	2,200	4,800
At cross section J	3.46	500	720	900	3,100
At cross section K	3.22	350	470	550	2,600

*Outside corporate limits

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of the streams in the community were carried out to provide estimates of the elevations of floods of the selected recurrence intervals along each stream studied in detail.

Cross section data for the streams in the study area were obtained by field survey. All bridges and culverts were field surveyed to obtain elevation data and structural geometry. Cross sections were located at close intervals upstream and downstream of bridges and culverts in order to compute significant backwater effects of these structures. The locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles (Exhibit 1). For streams for which a floodway is computed (Section 4.2), selected cross section locations are also shown on the Flood Boundary and Floodway Map (Exhibit 2).

Roughness coefficients (Manning's "n") for the computations were estimated on the basis of field inspection by experienced USGS personnel. The roughness coefficients ranged from 0.04 to 0.10 for the main channel and 0.04 to 0.10 for the overbank areas. Full weight was given to the consideration of average year-round conditions.

Flood profiles were drawn showing computed water-surface elevations to an accuracy of 0.5 foot for floods of the selected recurrence intervals (Exhibit 1). Water-surface elevations of floods of the selected recurrence intervals were developed using USGS computer step-backwater programs E-431 and J-635 (Reference 14).

The starting water-surface elevations were obtained by assigning different starting water-surface elevations until convergence was obtained at the first cross section within the study area.

All elevations used in this study are referenced to National Geodetic Vertical Datum of 1929 (NGVD); the elevation reference marks used in this study are shown and described on the maps.

Approximate flood hazard boundaries were obtained from the Special Flood Hazard Boundary Map.

Flood elevations in the City of Converse may be raised by debris blockages of the streams in the study area. The hydraulic analyses for this study, however, are based only on the effect of unobstructed flow. The flood elevations as shown on the profiles are thus considered valid only is hydraulic structures in general remain unobstructed and do not fail.

4.0 FLOOD PLAIN MANAGEMENT APPLICATIONS

A prime purpose of the National Flood Insurance Program is to encourage state and local governments to adopt sound flood plain management programs. Each Flood Insurance Study, therefore, includes a flood boundary map designed to assist communities in developing sound flood plain management measures.

4.1 Flood Boundaries

In order to provide a national standard without regional discrimination, the 100-year flood has been adopted by the FIA as the base flood for purposes of flood plain management measures. The 500-year flood is employed to indicate additional areas of flood risk in the community. For each stream studied in detail, the boundaries of the 100- and the 500-year floods have been delineated using the flood elevations determined at each cross section; between cross sections, the boundaries were interpolated using topographic maps at a scale of 1:6,000, with a contour interval of 10 feet (Reference 10). In cases where the 100- and the 500-year flood boundaries are close together, only the 100-year boundary has been shown.

The boundaries of the 100- and 500-year floods are shown on the Flood Boundary and Floodway Map (Exhibit 2). Small areas within the flood boundaries may lie above the flood elevations and, therefore, not be subject to flooding; owing to limitations of the map scale, or lack of detailed topographic data, such areas are not shown.

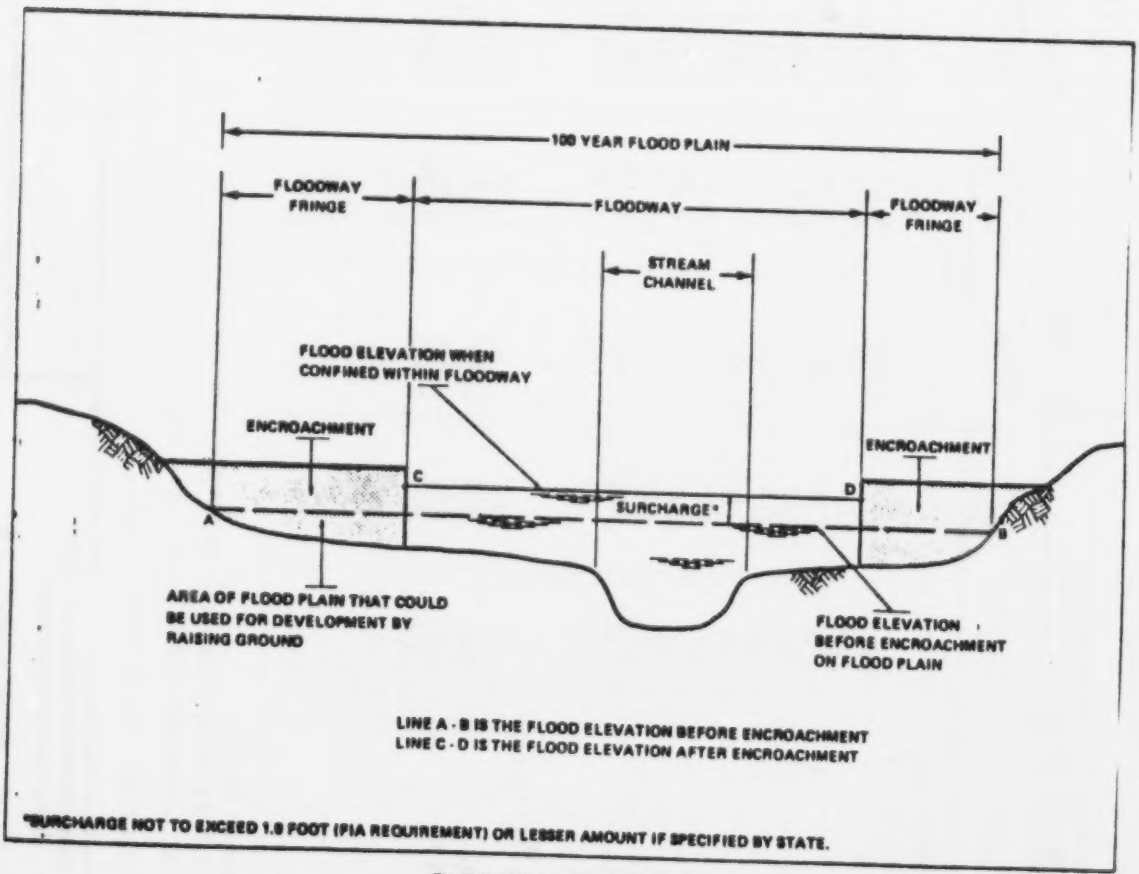
4.2 Floodways

Encroachment on flood plains, such as artificial fill, reduces the flood-carrying capacity, increases the flood heights of streams, and increases flood hazards in areas beyond the encroachment itself. One aspect of flood plain management involves balancing the economic gain from flood plain development against the resulting increase in flood hazard. For purposes of the Flood Insurance Program, the concept of a floodway is used as a tool to assist local communities in this aspect of flood plain management. Under this concept, the area of the 100-year flood is divided into a floodway and a floodway fringe. The floodway is the channel of a stream, plus any adjacent flood plain areas that must be kept free of encroachment in order that the 100-year flood may be carried without substantial increases in flood heights. Minimum standards of the FIA limit such increases in flood heights to 1.0 foot, provided that hazardous velocities are not produced. The floodways in this report are presented to local agencies as minimum standards that can be adopted or that can be used as a basis for additional studies.

The floodway presented in this study was computed on the basis of equal conveyance reduction from each side of the flood plain with minor adjustments to produce a floodway with inform width. The results of Floodway computations at each cross section are given in Table 2, "Floodway Data."

As shown on the Flood Boundary and Floodway Map (Exhibit 2), the floodway boundaries were determined at cross sections; between cross sections, the boundaries were interpolated.

The area between the floodway and the boundary of the 100-year flood is termed the floodway fringe. The floodway fringe thus encompasses the portion of the flood plain that could be completely obstructed without increasing the water-surface elevation of the 100-year flood more than 1.0 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to flood plain development are shown in Figure 2.


100 YEAR FLOOD PLAIN
FLOODWAY FRINGE
FLOODWAY
FLOODWAY FRINGE
STREAM CHANNEL
FLOOD ELEVATION WHEN CONFINED WITHIN FLOODWAY
ENCROACHMENT
ENCROACHMENT
C
D
A
B
SURCHARGE*
AREA OF FLOOD PLAIN THAT COULD BE USED FOR DEVELOPMENT BY RAISING GROUND
FLOOD ELEVATION BEFORE ENCROACHMENT ON FLOOD PLAIN
LINE A - B IS THE FLOOD ELEVATION BEFORE ENCROACHMENT
LINE C - D IS THE FLOOD ELEVATION AFTER ENCROACHMENT
*SURCHARGE NOT TO EXCEED 1.0 FOOT (FIA REQUIREMENT) OR LESSER AMOUNT IF SPECIFIED BY STATE.

FLOODWAY SCHEMATIC Figure 2

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F.P.S.)	REGULATORY (NGVD)	WITHOUT FLOODWAY (NGVD)	WITH FLOODWAY (NGVD)	INCREASE (FEET)
West Salitrillo Creek								
A*	370	122	768	4.69	645.7	645.7	646.7	1.0
B	720	150	712	5.05	647.0	647.0	647.9	0.9
C	2,250	234	929	3.55	651.9	651.9	652.7	0.8
D	2,950	143	510	6.47	656.2	656.2	657.2	1.0
E	3,200	317	1,947	1.70	661.7	661.7	662.7	1.0
F	5,250	92[2]	365	7.40	665.8	665.8	666.5	0.7
G	5,900	130[2]	582	4.64	670.2	670.2	670.7	0.5
H	7,660	130[2]	255	8.81	680.0	680.0	680.1	0.1
I	9,600	169[2]	573	3.14	694.8	694.8	695.8	1.0
J	10,000	146[2]	400	4.50	697.4	697.4	697.9	0.5
K	11,850	80[2]	183	1.26	706.4	706.4	706.8	0.4
East Salitrillo Creek								
A*	570	319	1,494	4.62	643.1	643.1	644.1	1.0
B*	1,440	150	816	8.21	647.4	647.4	648.2	0.8
C	1,560	227	1,475	4.54	648.5	648.5	649.5	1.0

[1]Feet above mouth
[2]These widths extend beyond corporate limits
*Outside corporate limits

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

CITY OF CONVERSE, TX

(BEXAR CO.)

FLOODWAY DATA

WEST SALITRILLO CREEK-EAST SALITRILLO CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F.P.S.)	REGULATORY (NGVD)	WITHOUT FLOODWAY (NGVD)	WITH FLOODWAY (NGVD)	INCREASE (FEET)
East Salitrillo Creek (cont'd)								
D*	3,500	175	924	6.49	656.6	656.6	657.6	1.0
E	8,430	125[2]	767	3.78	678.4	678.4	679.4	1.0
F	8,670	195	865	3.35	679.0	679.0	679.8	0.8
G	10,030	113[2]	492	5.49	689.1	689.1	689.2	0.1
H	10,450	339	1,950	1.38	692.8	692.8	693.8	1.0
I*	13,030	100	249	8.84	703.5	703.5	703.5	0.0
J*	18,100	100	316	2.85	737.4	737.4	738.0	0.6
K	19,500	137[2]	188	2.93	742.4	742.4	742.4	0.0

[1]Feet above mouth
[2]These widths extend beyond corporate limits
*Outside corporate limits

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

CITY OF CONVERSE, TX
(BEXAR CO.)

FLOODWAY DATA

EAST SALITRILLO CREEK

5.0 INSURANCE APPLICATION

In order to establish actuarial insurance rates, the FIA has developed a process to transform the data from the engineering study into flood insurance criteria. This process includes the determination of reaches, Flood Hazard Factors (FHFs), and flood insurance zone designations for each significant flooding source affecting the City of Converse.

5.1 Reach Determinations

Reaches are defined as lengths of watercourses having relatively the same flood hazard, based on the average weighted difference in water-surface elevations between the 10- and 100-year floods. This difference does not have a variation greater than that indicated in the following table for more than 20 percent of the reach.

Average Difference Between 10- and 100-Year Floods	Variation
Less than 2 feet	0.5 foot
2 to 7 feet	1.0 foot

Four reaches meeting the above criteria were required for the flooding sources of the City of Converse. The locations of the reaches are shown on the Flood Profiles (Exhibit 1).

5.2 Flood Hazard Factors

The FHF is the FIA device used to correlate flood information with insurance rate tables. Correlations between property damage from floods and their FHFs are used to set actuarial insurance premium rate tables based on FHFs from 005 to 200.

The FHF for a reach is the average weighted difference between the 10- and 100-year flood water-surface elevations expressed to the nearest one-half foot, and shown as a three-digit code. For example, if the difference between water-surface elevations of the 10- and 100-year floods is 0.7 foot, the FHF is 005; if the difference is 1.4 feet, the FHF is 015; if the difference is 5.0 feet, the FHF is 050. When the difference between the 10- and 100-year water-surface elevations is greater than 10.0 feet, accuracy for the FHF is to the nearest foot.

5.3 Flood Insurance Zones

After the determination of reaches and their respective FHFs, the entire incorporated area of the City of Converse was divided into zones, each having a specific flood potential or hazard. Each zone was assigned one of the following flood insurance zone designations.

Zone A:	Special Flood Hazard Areas inundated by the 100-year flood, determined by approximate methods; no base flood elevations shown or FHFs determined.
Zones A1, A2, A3	Special Flood Hazard Areas inundated by the 100-year flood, determined by detailed methods; base flood elevations shown, and zones subdivided according to FHFs.
Zone B:	Areas between the Special Flood Hazard Area and the limits of the 500-year flood, including areas of the 500-year flood plain that are protected from the 100-year flood by dike, levee, or other water control structure; areas subject to certain types of 100-year shallow flooding where depths are less than 1.0 foot; or areas subject to 100-year flooding from sources with drainage areas less than 1 square mile. Zone B is not subdivided.
Zone C:	Areas of minimal flooding.

Table 3, "Flood Insurance Zone Data," summarizes the flood elevation differences, FHFs, flood insurance zones, and base flood elevation for each flooding source studied in detail in the community.

5.4 Flood Insurance Rate Map Description

The Flood Insurance Rate Map for the City of Converse is, for insurance purposes, the principal result of the Flood Insurance Study. This map (published separately) contains the official delineation of flood insurance zones and base flood elevation lines. Base flood elevation lines show the locations of the expected whole-foot water-surface elevations of the base (100-year) flood. This map is developed in accordance with the latest flood insurance map preparation guidelines published by the FIA.

FLOODING SOURCE	PANEL[1]	ELEVATION DIFFERENCE[2] BETWEEN 1.0% (100-YEAR) FLOOD AND			FHF	ZONE	BASE FLOOD ELEVATION[3] (NGVD)
		10% (10 YR.)	2% (50 YR.)	0.2% (500 YR.)			
West Salitrillo Creek							
Reach 1	0001	-1.5	-0.6	1.6	015	A3	Varies
Reach 2	0001	-0.7	-0.2	1.4	005	A1	Varies
East Salitrillo Creek							
Reach 1	0001	-1.2	-0.3	1.2	010	A2	Varies
Reach 2	0001	-0.5	-0.2	2.0	005	A1	Varies

[1]FLOOD INSURANCE RATE MAP PANEL
[2]WEIGHTED AVERAGE
[3]ROUNDED TO NEAREST FOOT-SEE MAP

TABLE 3

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

CITY OF CONVERSE, TX
(BEXAR CO.)

FLOOD INSURANCE ZONE DATA

WEST SALITRILLO CREEK-EAST SALITRILLO CREEK

6.0 OTHER STUDIES

A Type-7 flood study was made for Converse in 1973 (Reference 11), which employed approximate methods with cross sections taken from the USGS topographic map, Schertz Quadrangle, which has 10-foot contour intervals, with the effects of bridges and roadways not being considered. This much more detailed study, therefore, supersedes the earlier one.

7.0 LOCATION OF DATA

Survey, hydrologic, hydraulic, and other pertinent data used in this study can be obtained by contacting the office of the Federal Emergency Management Agency, Insurance and Mitigation Division, Federal Center, Denton, Texas 76201.

8.0 BIBLIOGRAPHY AND REFERENCES

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REACH 1
ZONE A3

REACH 2
ZONE A1

CORPORATE LIMITS
FARM MARKET ROAD
1516

SEGUIN ROAD

FARM MARKET ROAD 78

CORPORATE LIMITS

ELEVATION (FEET NGVD)

675
670
665
660
655
650
645
640
635

0 500 1000 1500 2000 2500 3000 3500 4000 4500 5000 5500 6000

STREAM DISTANCE IN FEET ABOVE MOUTH

A B C D E F G

LEGEND

500–YEAR FLOOD
100–YEAR FLOOD
50–YEAR FLOOD
10–YEAR FLOOD
STREAM BED
A CROSS SECTION LOCATION

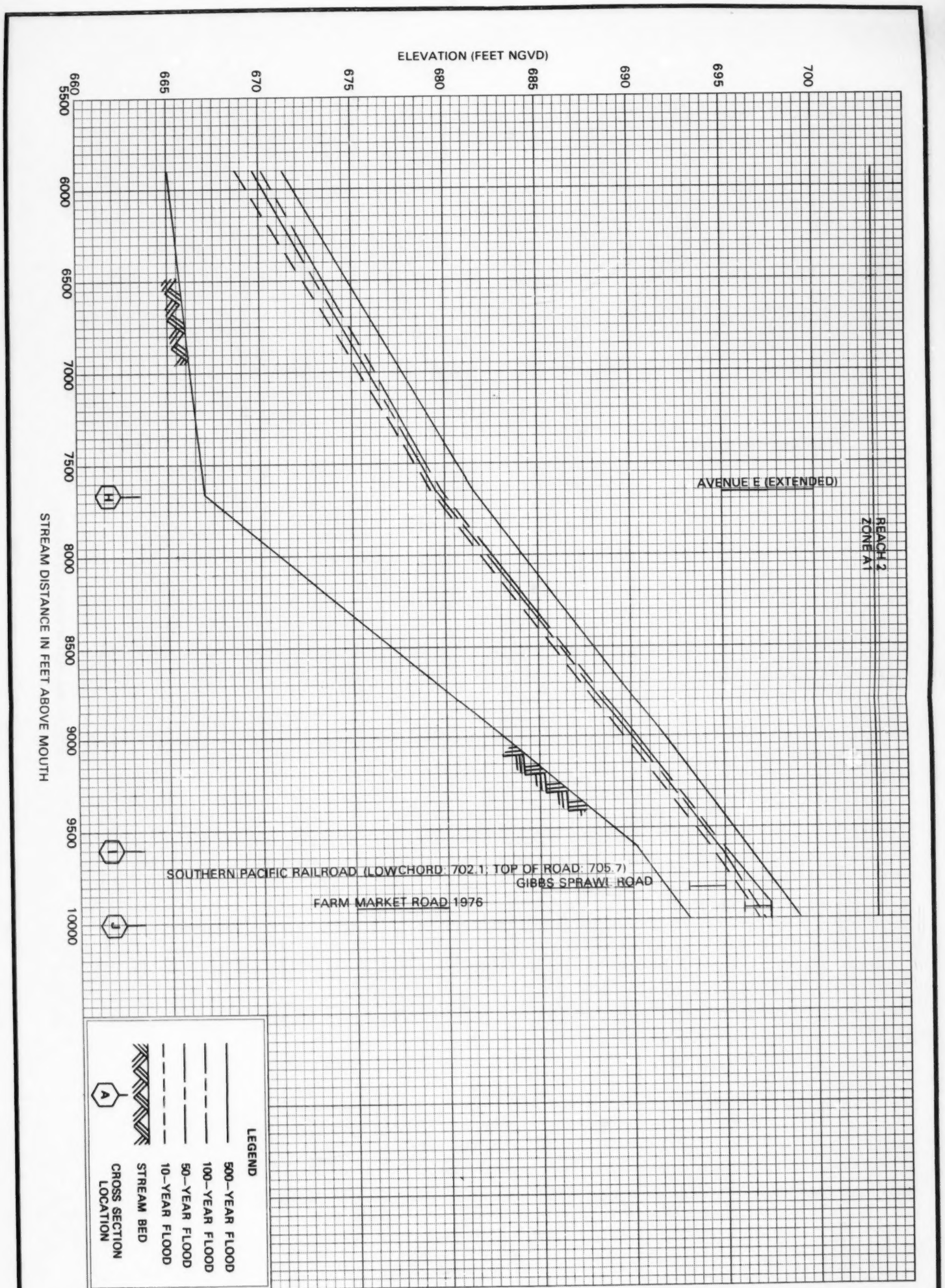
FLOOD PROFILES

WEST SALITRILLO CREEK

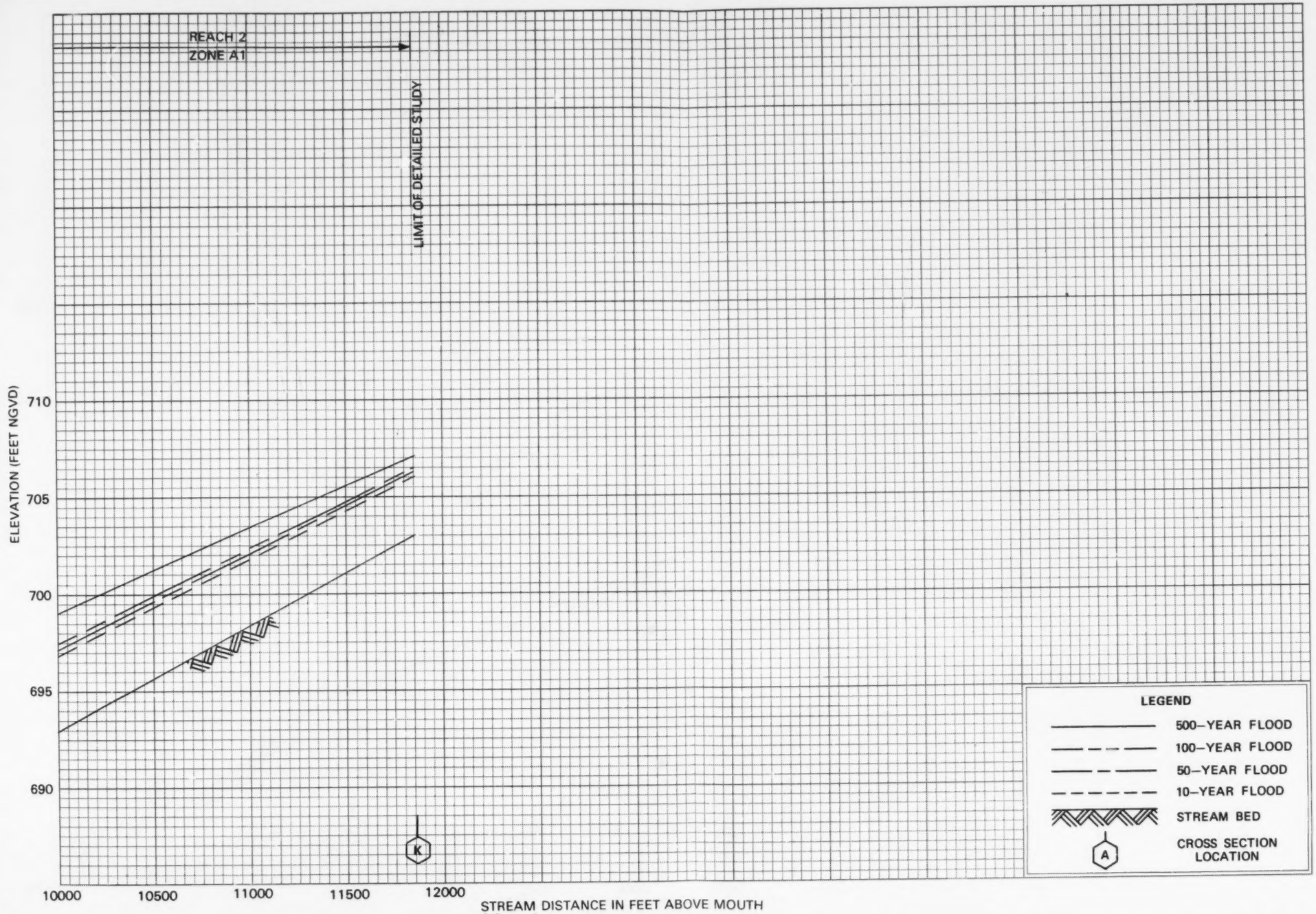
FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

CITY OF CONVERSE, TX
(BEXAR CO.)

01P



02P	FEDERAL EMERGENCY MANAGEMENT AGENCY Federal Insurance Administration CITY OF CONVERSE, TX (BEXAR CO.)	FLOOD PROFILES WEST SALITRILLO CREEK



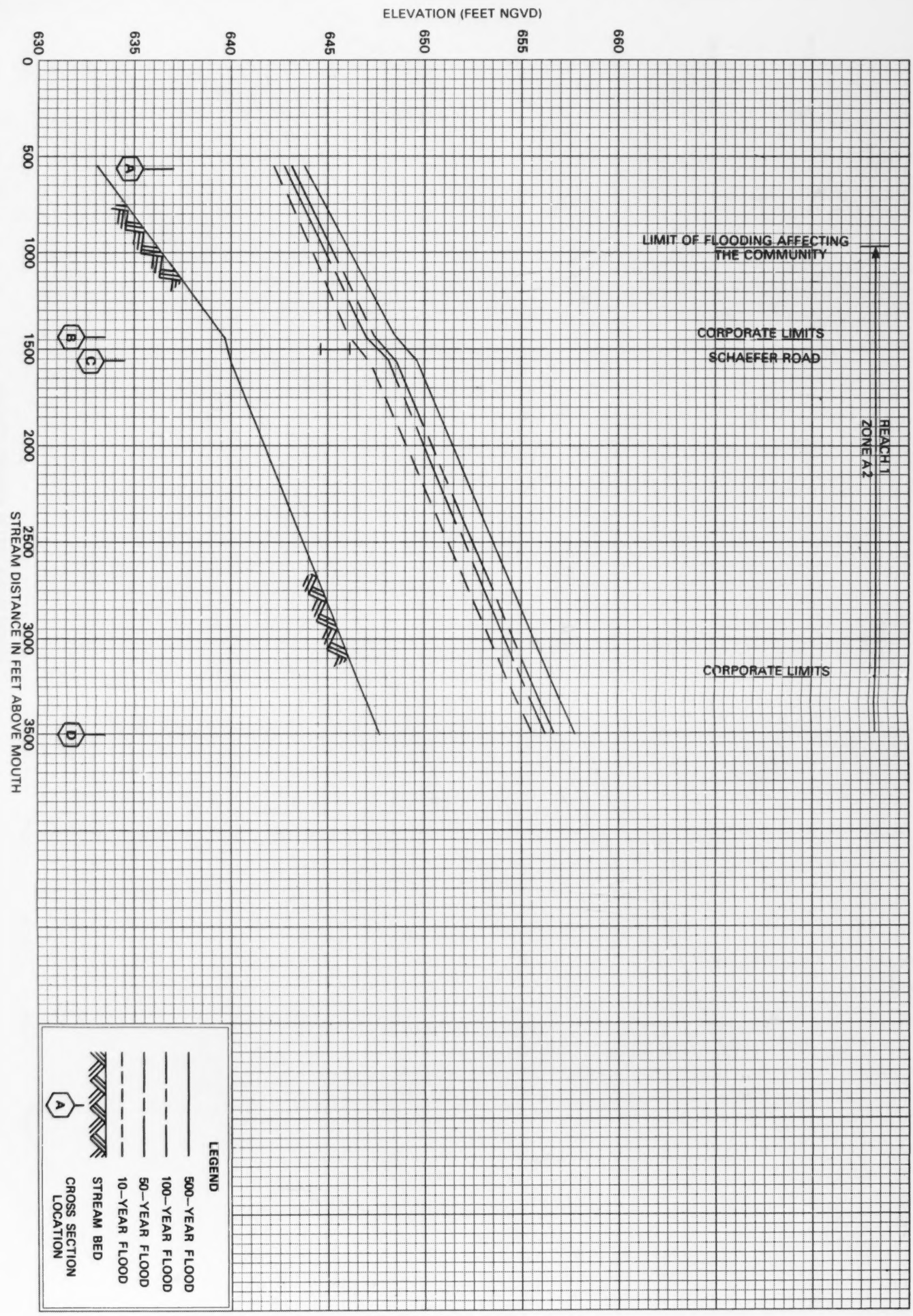
FLOOD PROFILES

WEST SALITRILLO CREEK

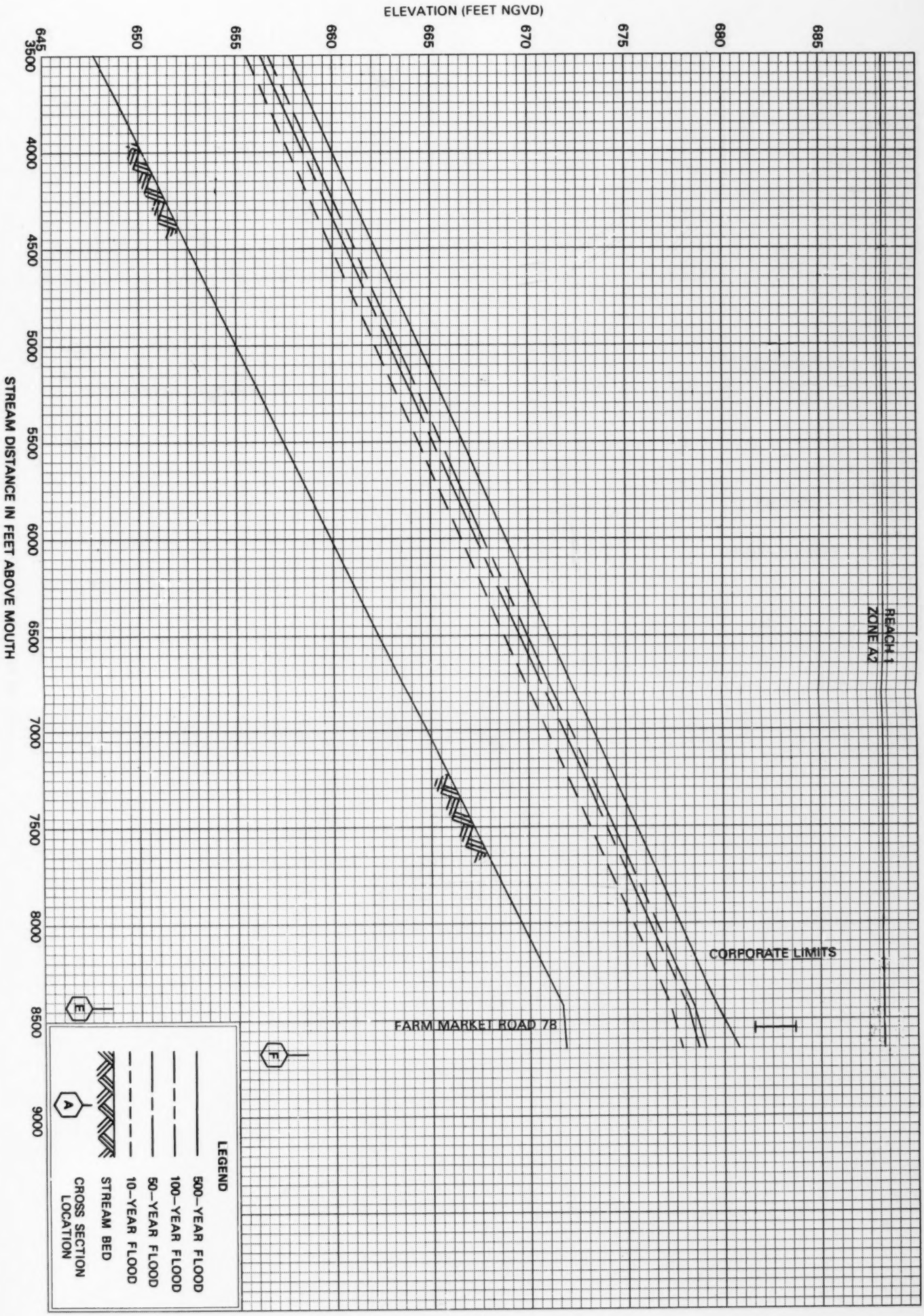
FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

CITY OF CONVERSE, TX
(BEXAR CO.)

03P



04P	FEDERAL EMERGENCY MANAGEMENT AGENCY Federal Insurance Administration **CITY OF CONVERSE, TX** (BEXAR CO.)	**FLOOD PROFILES** **EAST SALITRILLO CREEK**



05P

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

CITY OF CONVERSE, TX
(BEXAR CO.)

FLOOD PROFILES

EAST SALITRILLO CREEK

REACH 1
ZONE A2

LOWER SEGUIN ROAD

FM 1976

CORPORATE LIMITS

ELEVATION (FEET NGVD)

705
700
695
690
685
680
675
670

8500 9000 9500 10000 10500 11000 11500 12000 12500 13000 13500

STREAM DISTANCE IN FEET ABOVE MOUTH

SOUTHERN PACIFIC RAILROAD

G H

LEGEND

500–YEAR FLOOD
100–YEAR FLOOD
50–YEAR FLOOD
10–YEAR FLOOD
STREAM BED
A — CROSS SECTION LOCATION

FLOOD PROFILES

EAST SALITRILLO CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

CITY OF CONVERSE, TX
(BEXAR CO.)

06P

FLOOD PROFILES

EAST SALITRILLO CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

CITY OF CONVERSE, TX
(BEXAR CO.)

07P

REACH 2
ZONE A1

CORPORATE LIMITS

CORPORATE LIMITS

ELEVATION (FEET NGVD)

750

745

740

735

730

K

18000 18500 19000 19500

STREAM DISTANCE IN FEET ABOVE MOUTH

LEGEND

500–YEAR FLOOD

100–YEAR FLOOD

50–YEAR FLOOD

10–YEAR FLOOD

STREAM BED

A — CROSS SECTION LOCATION

best copy available

FLOOD PROFILES

EAST SALITRILLO CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

CITY OF CONVERSE, TX
(BEXAR CO.)

08P